

BROMUS MOLLIS AND ALLIES IN NEW ENGLAND

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A problem like that in many other species is presented by *Bromus mollis* L., in which confusion has arisen because of unrecognized species, varieties, or forms. Apparently this species has been interpreted as including all specimens with short peduncles and hairy lemmas. In its form with glabrous lemmas, it has often been confused with *B. racemosus* L., and the form of *B. commutatus* Schrader with hairy lemmas has often been mistaken for typical *B. mollis*.

To Mr. Peter S. Green of the Arnold Arboretum I am indebted for calling my attention to the presence, in New England, of more than one species commonly included in *Bromus mollis*, for lending me a key which set apart neglected or little recognized taxa, and for making very valuable suggestions regarding this article. To him I express my hearty thanks. I thank Dr. Richard A. Howard, Director of the Arnold Arboretum, and Dr. Reed C. Rollins, Director of the Gray Herbarium, and Mr. Richard J. Eaton, Curator of the Herbarium of the New England Botanical Club, for the privilege of referring to specimens deposited in their institutions. I appreciate very much the help of Dr. Robert C. Foster, of the Gray Herbarium, and Dr. Lily M. Perry and Mr. Green, of the Arnold Arboretum, in finding references for original descriptions. I thank Mrs. Lazella M. Schwarten for the facilities of the Harvard Herbarium Library, and Dr. C. E. Hubbard of the Royal Botanic Gardens, Kew, England, for the reference for *B. commutatus* Schrader var. *pubens* Wats. Appreciation is expressed also to Dr. Howard W. Pfeifer, of the University of Connecticut and Mr. Leopold A. Charette, until recently of Yale University, for citations of specimens in their respective institutions.

In 1833, Hardouin (Congr. Sci. France 1: 59. 1833) proposed a new name, *Bromus Thominii*, for a grass which had previously been described and named *B. arenarius*

Thomine-Desmases (Mem. Soc. Linn. Calvados 1: 40. 1824) because Labillardière had used the name *B. arenarius* for another species in 1804. However, many botanists have considered this species not sufficiently distinct from *B. mollis*; and in America, where it has been introduced, it has commonly been overlooked or ignored to the present time. In 1924, another segregate of *B. mollis* was recognized at specific rank, namely *B. lepidus* Holmberg (Botaniska Notiser 1924: 326.).

Plants differing from the typical by having, or lacking, pubescence on the lemmas occur in these species and have often been treated as varieties. Here, the example of Fernald and Holmberg is followed by reducing them to forms. When a taxon differs from the typical variant in only one character and does not seem to have a distinct geographic range, it seems more appropriate to recognize it as a form rather than a variety.

Much of the confusion in these species arises from the fact that all three of them and also *Bromus commutatus* Schrader and *B. secalinus* L. may have either glabrous or hairy lemmas. Consequently, pubescence on the lemmas, or lack of it, does not separate these species. In an effort to clarify this group and some others to which they are closely related, the following key is presented, dealing with all the New England species in the sections Bromium Dum. in the Manual of Grasses of the United States by A. S. Hitchcock, ed. 2 by Agnes Chase, 1951, and Zeobromus Griseb. in Gray's Manual, ed. 8, by M. L. Fernald, 1950.

- A. Branches of panicle short; peduncles all or mostly shorter than spikelets; panicle erect; margins of lemmas overlapping the lemma next to them.
 - B. Lower lemmas 8-11 mm long; lower glume (6-)7-9 mm long; upper glume (7-)8-9 mm long. 1. *B. mollis*.
 - C. Lemmas hairy. 1a. *B. mollis* f. *mollis*.
 - C. Lemmas glabrous. 1b. *B. mollis* f. *leiostachys*.
 - B. Lower lemmas 5.5-7.5 mm long; lower glume 4.5-6 mm long; upper glume 5.5-6.6 mm long.
 - D. Lower lemmas 6.5-7.5 mm long; lower glume 4.5-6 mm

- long; upper glume 6-6.6 mm long; grain shorter than palea.
 2. *B. Thomini*.
- E. Lemmas glabrous, except minutely scabrous margins.
 2a. *B. Thomini* f. *Thomini*
- E. Lemmas hairy. 2b. *B. Thomini* f. *hirsutus*.
- D. Lower lemmas 5.5-6.5 mm long; lower glume 4.5-5 mm long; upper glume 5.5-6 mm long; grain longer than palea. 3. *B. lepidus*.
- F. Lemmas glabrous. 3a. *B. lepidus* f. *lepidus*.
- F. Lemmas hairy. 3b. *B. lepidus* f. *lasiolepis*.
- A. Branches of panicle longer; peduncles all or mostly longer than spikelets; panicle erect or drooping; margins of lemmas not always overlapping the lemma next to them.
- G. Margins of lemmas inrolled at maturity, leaving axis visible; lemmas 6.5-9 mm long. 4. *B. secalinus*.
- H. Lower lemmas 7-9 mm long; sheaths glabrous.
 4a. *B. secalinus* var. *secalinus*.
- I. Lemmas awnless.
 4c. *B. secalinus* var. *secalinus* f. *submuticus*.
- I. Lemmas with awns 1-6 mm long.
- J. Lemmas glabrous.
 4b. *B. secalinus* var. *secalinus* f. *secalinus*.
- J. Lemmas hairy.
 4d. *B. secalinus* var. *secalinus* f. *hirtus*.
- H. Lower lemmas 6.5-7 mm long, glabrous; lower sheaths hairy. 4e. *B. secalinus* var. *hirsutus*.
- G. Margins of lemmas concealing axis, not inrolled; lower lemmas 6.5-12 mm long.
- K. Lower lemmas 6.5-8(-9) mm long.
- L. Anthers 3-4.5 mm long; upper lemmas about as long as lower; panicle open, its branches spreading, lower branches more than two at a node, each bearing two or more spikelets; lower sheaths hairy, upper sheaths glabrous. 7. *B. arvensis*.
- L. Anthers 2-2.5 mm long; upper lemmas distinctly shorter than lower; panicle rather dense. its branches erect or ascending, lower branches 1-2 at a node, each bearing 1 (rarely 2) spikelets; sheaths all hairy.
 5. *B. racemosus*.
- K. Lower lemmas 9-12 mm long.
- M. Spikelets drooping, 0.8-1.3 cm wide, awnless or nearly so; anthers 0.8-1 mm long; branches of panicle usually bearing 1 spikelet; lower lemmas about as wide as long; palea much shorter than lemma, about 6 mm long. 8. *B. brizaeformis* Fischer & Meyer

- M. Spikelets erect or ascending, 4.5-6 mm wide; awns usually 4-10 mm long; anthers 1.5-2 mm long; branches of panicle usually bearing 2 or more spikelets; lower (and other) lemmas much longer than wide; palea about as long as lemma. 6. *B. commutatus*.
 N. Lemmas glabrous except minutely scabrous margins. 6a. *B. commutatus* f. *commutatus*.
 N. Lemmas hairy. 6b. *B. commutatus* f. *pubens*.

To assist further in identifying these species, a few representative specimens are cited. *Bromus mollis* is too familiar to require citations; likewise the typical forms of some other species. It will be evident from the list that in America *B. Thominii* f. *hirsutus* also is frequent whereas the other species and forms most closely related to them are less common.

1. *Bromus mollis* L. Sp. Pl. ed. 2. 112. 1763.
- 1a. *Bromus mollis* f. *mollis*.
- 1b. *Bromus mollis* f. *lelostachys* (Hartman) Fernald, *Rhodora* 35: 316. 1933.

In this article Fernald makes clear the reasons why this infraspecific epithet must be used instead of *lelostachys* of Persoon.

REPRESENTATIVE SPECIMENS. MASSACHUSETTS: Roxbury, 1878, *E. Faxon* (VT); Lancaster, 1 July 1943, *F. C. Seymour* 7240 (NEBC). CONNECTICUT: Fairfield, 12 June 1914, *E. H. Eames* 8753 (GH). NEW JERSEY: Camden, 3 June 1877, *Parker* (GH). DISTRICT OF COLUMBIA: Washington, 31 May 1905, *A. S. Hitchcock*, Am. Grasses 891 (GH), distributed as *B. racemosus* L., see *Rhodora* 35: 316. 1933. MICHIGAN: near Lansing, 22 June 1886, *L. H. Bailey, Jr.* (GH). IDAHO: New Plymouth, 21 May 1910, *J. F. Macbride* 94 (GH). OREGON: without precise locality, *Elihu Hall* 1871 (GH).

2. *Bromus Thominii* Hardouin, Congr. Sci. France 1: 59. 1833.
- 2a. *Bromus Thominii* f. *Thominii*.

REPRESENTATIVE SPECIMENS. MASSACHUSETTS: Stockbridge, 25 July 1914, *R. Hoffmann* (NEBC). RHODE ISLAND: Block Island, 12 Aug. 1919, *C. B. Graves* (NEBC). CONNECTICUT: Bridgeport, 24 June 1915, *E. H. Eames* 9022 (NEBC). BRITISH COLUMBIA: Vancouver Island, 20 June 1907, *C. O. Rosendahl* 1887 (GH).

- 2b. *Bromus Thominii* f. *hirsutus* (Holmberg) Hylander, Uppsala Univ. Arskr 1945 (7): 85. 1945.

REPRESENTATIVE SPECIMENS. MAINE: Seal Harbor, Mt. Desert Island, 9 July 1928, *G. L. Stebbins, Jr.* 327 (NEBC); N. Berwick, 4 July 1892,

J. C. Parlin (GH, NEBC). MASSACHUSETTS: Salem, 26 May 1890, *W. P. Conant* (NEBC); Cambridge, 10 June 1891, *M. L. Fernald* (NEBC); Lincoln, 16 June 1913, *M. L. Fernald* (NEBC); Boston, Parker's Hill, June 1877, *C. E. Faxon* (GH); Centerville, 17 June 1896, *E. F. Williams* (NEBC); Nonamesset, 29 May 1928, *J. M. Fogg, Jr.* 3394 (NEBC); Penikese, 3 July 1928, *J. M. Fogg, Jr.* 3412 (NEBC); Chilmark, 23 Aug. 1895, *Sydney Harris* (NEBC); Nantucket, 15 June 1909, Mrs. *N. F. Flynn* (VT). RHODE ISLAND: Block Island, 30 June 1938, *K. P. Jansson* (CONN). CONNECTICUT: New London, 1891, *C. B. Graves* (GH); 16 June 1932, *K. P. Jansson* (CONN); Hartford, 2 June 1901, *A. W. Driggs* (GH). NEW YORK, Long Island, Orient Point, 26 July 1940, *K. P. Jansson* (CONN). MICHIGAN: Meridan Twp. T4N, R1W sec. 7, Ingham Co., *G. W. Parmelee* 231 (VT). ILLINOIS: Peoria, July 1904, *F. E. McDonald* (GH). NEVADA: King's Canon, *C. F. Baker* 1104 (VT). CALIFORNIA: Mather, 30 May 1931, *D. D. Keck* 1126 (GH); Redding, Shasta Co., 4 July 1914, *L. E. Smith* (GH); Webb Ranch, San Mateo Co., 5 May 1960, *D. M. Porter* 678 (GH). WASHINGTON: Pullman, 8 July 1950, *L. C. Hulbert* 499 (CONN).

3. *Bromus lepidus* Holmberg, Bot. Not. 1924: 326. 1924.

3a. *Bromus lepidus* f. *lepidus*.

REPRESENTATIVE SPECIMENS. MASSACHUSETTS: Stockbridge, 21 June 1915, *R. Hoffmann* (NEBC). CONNECTICUT: Bridgeport, 24 June 1915, *E. H. Eames* (VT).

3b. *Bromus lepidus* f. *lasiolepis* Holmberg, Bot. Not. 1924: 326. 1924. Syn. f. *micromollis* (Krösche) Holmberg in Hartman, Handb. Skand. Fl. ed. Holmberg, 265. 1926.

REPRESENTATIVE SPECIMEN. MASSACHUSETTS: Jamaica Plain, 19 June 1963, *P. S. Green* 49/63 (NEBC).

4. *Bromus secalinus* L. Sp. Pl. 76. 1753.

4a. *Bromus secalinus* var. *secalinus*.

4b. *Bromus secalinus* var. *secalinus* f. *secalinus*

4c. *Bromus secalinus* var. *secalinus* f. *submuticus* (Reichenb.) Ascherson & Graebner, Syn. Mitteleurop. Fl. 2(1): 604. 1901.

REPRESENTATIVE SPECIMENS. MAINE: E. Auburn, 1 Sept. 1897, ex herb. *E. B. Chamberlain* (NEBC); N. Berwick, 26 June 1896, *J. C. Parlin* (NEBC). MASSACHUSETTS: Jamaica Plain, 6 Aug. 1925, *E. J. Palmer* 28164 (NEBC); New Bedford, s.d., *E. W. Hervey* (NEBC). CONNECTICUT: West Haven, 30 June 1903, *R. W. Woodward* (NEBC).

4d. *Bromus secalinus* var. *secalinus* f. *hirtus* (F. Schultz) Seymour, stat. nov. Basionym: *B. mutabilis* F. Schultz var. *hirtus* F. Schultz, Flora 32: 234. 1849. Synonym: *B. secalinus* L. var. *hirtus* (F. Schultz) Ascherson & Graebner, Syn. Mitteleurop. Fl. 2(1): 604. 1901.

REPRESENTATIVE SPECIMENS. MAINE: Bethel, 25 June 1938, *L. A. Wheeler* (NEBC). CONNECTICUT: Southington, 26 June 1903, *C. H. Bissell* (NEBC).

4e. *Bromus secalinus* var. *hirsutus* Kindberg, Bot. Not. 1887: 32. 1887.

REPRESENTATIVE SPECIMENS: VERMONT: Townshend, 23 June 1912, *L. A. Wheeler* (NEBC). MASSACHUSETTS: Revere, 1878, *H. A. Young* (NEBC); Needham, 30 July 1883, *T. O. Fuller* (NEBC); Milton, 15 July 1918, *N. T. Kidder* (NEBC); Hingham, 11 July 1926, *C. H. Knowlton* (NEBC). RHODE ISLAND: Edgewood, 26 June 1913, *T. Hope* (NEBC). CONNECTICUT: Waterbury, 14 July 1910, *A. E. Blewitt* 160 (NEBC).

5. *Bromus racemosus* L. Sp. Pl. ed 2. 114.

REPRESENTATIVE SPECIMENS: MAINE: Foxcroft, 25 June 1894, *M. L. Fernald* 565 (NEBC); Seal Harbor, 9 July 1928, *G. L. Stebbins, Jr.* 326 (NEBC); 29 June 1899, *E. L. Rand* (NEBC). MASSACHUSETTS: Charlestown, 19 Aug. 1879, *C. E. Perkins* (NEBC); Brookline, 14 June 1883, *C. W. Jenks* (NEBC); Nantucket, 21 June 1910, *E. P. Bicknell* 9773 (NEBC).

6. *Bromus commutatus* Schrader, Fl. Germ. 1: 353. 1806. Synonym: *B. pratensis* Erhart ex Hoffm. Deutschl. Fl. ed. 2. 2: 52. 1800, non Lamarck 1783.

6a. *Bromus commutatus* f. *commutatus*.

6b. *Bromus commutatus* f. **pubens** (Wats.) Seymour, stat. nov.
Basionym: *B. commutatus* Schrader var. *pubens* Wats., Phytologist 1: 1062. 1844.

REPRESENTATIVE SPECIMENS: MAINE: N. Berwick, 27 June 1897, *J. C. Parlin* 849 (NEBC). VERMONT: Ely, 27 June 1935, *A. A. Beetle* 37 (NEBC). MASSACHUSETTS: Milton, 8 June 1924, *N. T. Kidder* (NEBC). CONNECTICUT: North Haven, 30 June 1962, *R. J. Eaton* 2 June 1909 & 18 June 1910, *E. P. Bicknell* (NEBC).

7. *Bromus arvensis* L. Sp. Pl. 77. 1753.

REPRESENTATIVE SPECIMENS: MASSACHUSETTS: Arnold Arboretum, 8 June 1942, *E. J. Palmer* 46002 (NEBC); Grafton, 30 June 1951, *B. N. Gates* 27059 (NEBC); Worcester, 10 July 1946, *B. N. Gates* 20499 (NEBC). CONNECTICUT: North Haven, 30 June 1962, *R. J. Eaton* (NEBC); Bridgeport, 1 July 1912, *E. H. Eames* 8543 (NEBC); Bridgeport, 10 July 1912, *E. H. Eames* 8568 (NEBC).

8. *Bromus brizaeformis* Fischer & Meyer, Ind. Sem. Hort. Petrop. 3: 30. 1837.

REPRESENTATIVE SPECIMENS: VERMONT: Charlotte, 27 June 1880,

C. G. Pringle (VT). MASSACHUSETTS: South Boston, 28 May 1879 & 8 June 1879, *C. E. Perkins* (NEBC); Charlestown, 23 July 1881, Herb. *C. W. Swan* (YU); New Bedford, 15 July 1903, Herb. *E. W. Hervey* (NEBC). CONNECTICUT: East Haddam, 5 July 1903, *H. S. Clark* (NEBC); New Haven, 1884, *R. W. Woodward* (NEBC). WASHINGTON: *Pullman*, May 1898, A. D. E. Elmer 1330 (VT); Whitman Co., Karniak Mt., Willamette Mer. 20 July 1951, *L. C. Hulbert 2326* (CONN). ONTARIO: comte d'Haldimand, 2 July 1936, *F. Marie-Victorin, F. Rolland-Germain, F. Dominique 46200* (CONN).

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